

Roll No. ....

Question Booklet Number

O. M. R. Serial No.

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## M. Sc. (Biotechnology) (Fourth Semester)

### EXAMINATION, July, 2022

#### ANIMAL CELL CULTURE, MEDICAL & MICROBIAL BIOTECHNOLOGY

##### Paper Code

MBT	4	0	0	1
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Questions Booklet  
Series

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Time : 1:30 Hours ]

[ Maximum Marks : 100

##### Instructions to the Examinee :

1. Do not open the booklet unless you are asked to do so.
2. The booklet contains 60 questions. Examinee is required to answer any 50 questions in the OMR Answer-Sheet provided and not in the question booklet. If more than 50 questions are attempted by student, then the first attempted 50 questions will be considered for evaluation. All questions carry equal marks.
3. Examine the Booklet and the OMR Answer-Sheet very carefully before you proceed. Faulty question booklet due to missing or duplicate pages/questions or having any other discrepancy should be got immediately replaced.

##### परीक्षार्थियों के लिए निर्देश :

1. प्रश्न-पुस्तिका को तब तक न खोलें जब तक आपसे कहा न जाए।
2. प्रश्न-पुस्तिका में 60 प्रश्न हैं। परीक्षार्थी को किन्हीं 50 प्रश्नों को केवल दी गई OMR आन्सर-शीट पर ही हल करना है, प्रश्न-पुस्तिका पर नहीं। यदि छात्र द्वारा 50 से अधिक प्रश्नों को हल किया जाता है तो प्रारम्भिक हल किये हुए 50 उत्तरों को ही मूल्यांकन हेतु सम्मिलित किया जाएगा। सभी प्रश्नों के अंक समान हैं।
3. प्रश्नों के उत्तर अंकित करने से पूर्व प्रश्न-पुस्तिका तथा OMR आन्सर-शीट को सावधानीपूर्वक देख लें। दोषपूर्ण प्रश्न-पुस्तिका जिसमें कुछ भाग छपने से छूट गए हों या प्रश्न एक से अधिक बार छप गए हों या उसमें किसी अन्य प्रकार की कमी हो, तो उसे तुरन्त बदल लें।

(Remaining instructions on the last page)

(शेष निर्देश अन्तिम पृष्ठ पर)

***(Only for Rough Work)***

1. The growth of animal cells in-vitro in a suitable culture medium is called \_\_\_\_\_.  
(A) Gene expression  
(B) Transgenesis  
(C) Plant tissue culture  
(D) Animal cell culture
2. Name the type of culture which is prepared by inoculating directly from the tissue of an organism to culture media :  
(A) Primary cell culture  
(B) Secondary cell culture  
(C) Cell lines  
(D) Transformed cell culture
3. Which of the following is not a live attenuated vaccine ?  
(A) Tetanus vaccine  
(B) Varicella vaccine  
(C) MMR vaccine  
(D) Influenza vaccine
4. Out of the following, which technique detects single nucleotide polymorphism ?  
(A) RFLP  
(B) AFLP  
(C) SSLP  
(D) SNP
5. Which of the following chemicals is used in the chemical transformation method ?  
(A) Cu  
(B)  $\text{FeSO}_4$   
(C)  $\text{SO}_2$   
(D)  $\text{CaCl}_2$
6. What is the clinical application of monoclonal antibodies ?  
(A) Biosensors  
(B) Transplant rejection  
(C) Infectious disease  
(D) Purification of drugs
7. Which of the following stages is not performed while isolating a primary culture ?  
(A) Isolation of the tissue  
(B) Cell counting  
(C) Disaggregation of the tissue  
(D) Seeding of culture into the culture vessel

8. In humans babies produced by in-vitro fertilization and embryo transfer are known as :
  - (A) in-vitro babies
  - (B) test-tube babies
  - (C) in-vitro-in-vivo babies
  - (D) All of the above
9. Which one is not a recombinant vaccine ?
  - (A) Vaccine for hepatitis-B
  - (B) Vaccine for human papilloma virus
  - (C) Vaccine for haemophilus influenza-B
  - (D) Vaccine against hepatitis-A
10. Artificial serum containing media contains \_\_\_\_\_ % serum in it.
  - (A) 0-10
  - (B) 5-20
  - (C) 20-50
  - (D) 30-50
11. The first vaccine developed in animal cell culture :
  - (A) Hepatitis-B
  - (B) Influenza
  - (C) Smallpox
  - (D) Polio
12. Name the mapping technique used to determine the position of restriction sites in a DNA molecule :
  - (A) Genetic map
  - (B) Restriction mapping
  - (C) Biochemical markers
  - (D) DNA markers
13. Interferons are :
  - (A) anti-cancer proteins
  - (B) anti-bacterial proteins
  - (C) antiviral proteins
  - (D) complex proteins
14. Penicillin is obtained from :
  - (A) *Penicillium griseofulvum*
  - (B) *Streptomyces griseus*
  - (C) *Penicillium chrysogenum*
  - (D) *Aspergillus fumigatus*
15. What is a cell line ?
  - (A) Multilayer culture
  - (B) Transformed cells
  - (C) Multiple growth of cells
  - (D) Subculturing of primary culture

16. Name the mechanism which is used to correct the defective gene :
- (A) Gene therapy
  - (B) Gene knock-out
  - (C) Gene knock-in
  - (D) Restriction fragment length polymers
17. The epidermis is considered the outermost component of the skin and primarily comprised of \_\_\_\_\_ a specific type of epithelial cells.
- (A) keratinocytes
  - (B) collagen
  - (C) stem cells
  - (D) chondrocytes
18. Tissue transplants usually give rise to a \_\_\_\_\_ response.
- (A) cold
  - (B) immune
  - (C) hot
  - (D) no
19. Which of the following is not a DNA marker ?
- (A) RAPD
  - (B) Hormone
  - (C) RFLP
  - (D) AFLP
20. The virus commonly used to infect cell cultures for the production of interferons :
- (A) Sendai virus
  - (B) Corona virus
  - (C) Polio virus
  - (D) Smallpox virus
21. Which organ cannot be transplanted at present ?
- (A) Brain
  - (B) Heart
  - (C) Lungs
  - (D) Pancreas

22. Which of the following statements is not true for genetic markers ?
- (A) A gene or a DNA sequence.
  - (B) Associated with a particular trait.
  - (C) Anything can be used as a genetic marker.
  - (D) The first genetic map prepared was of fruit fly.
23. The Taq polymerase enzyme is obtained from \_\_\_\_\_.
- (A) *Thiobacillus ferrooxidans*
  - (B) *Bacillus subtilis*
  - (C) *Pseudomonas putida*
  - (D) *Thermus aquaticus*
24. Which bacterium is used in the production of insulin by genetic engineering ?
- (A) *Saccharomyces*
  - (B) *Rhizobium*
  - (C) *Escherichia*
  - (D) *Mycobacterium*
25. Name the organism on which the first cell line was observed :
- (A) *E. coli*
  - (B) Sheep
  - (C) Mouse
  - (D) *Drosophila*
26. What holds true for the subunit vaccine ?
- (A) used bacterial toxin is main cause of illness.
  - (B) lead immune system to recognize the polysaccharide.
  - (C) include only antigens that stimulate immune system.
  - (D) produced by killing the disease causing microbes with chemical, heat and radiation.
27. A gene whose expression helps to identify transformed cell is known as :
- (A) Selectable marker
  - (B) Vector
  - (C) Plasmid
  - (D) Structural gene

28. The correct order of steps in Polymerase Chain Reaction (PCR) is :
- (A) Denaturation, Extension, Annealing
  - (B) Annealing, Extension, Denaturation
  - (C) Extension, Denaturation, Annealing
  - (D) Denaturation, Annealing, Extension
29. \_\_\_\_\_ is the advantage of animal tissue culture.
- (A) It is cost-effective
  - (B) No skilled personnel is required
  - (C) Tissue cultures can be stored for a long time
  - (D) Maintenance of environmental conditions is easy
30. Which of the following are “Anchorage Independent Cells” ?
- (A) Kidney
  - (B) Liver
  - (C) Pancreas
  - (D) Skeletal muscle cells
31. What is the full form of RFLP ?
- (A) Restriction Fragment Length Polymorphisms
  - (B) Random Fragment Length Polymorphism
  - (C) Restriction Find in Length of DNA Polymer
  - (D) Restriction Fragment Length Polymers
32. In the indirect ELISA test the enzyme linked antibody will attach to :
- (A) the patient antigen
  - (B) variable region of patient antibody
  - (C) constant region of patient antibody
  - (D) the wall of microtitre well
33. Which of the following is the oldest cell line ?
- (A) HeLa cell line
  - (B) Vero cell line
  - (C) CHO cell line
  - (D) BHK cell line
34. What kind vaccines include only antigens ?
- (A) Subunit
  - (B) Attenuated
  - (C) Toxoid
  - (D) Inactivated

35. Which enzyme is used for releasing mononuclear cells from soft tissues by enzymatic digestion ?
- (A) Collagenase  
(B) Pronase  
(C) Trypsin  
(D) All of the above
36. In which of the following methods electric field is applied for gene transfer ?
- (A) Electroporation  
(B) Microinjection  
(C) Particle bombardment  
(D) Sonoporation
37. Biolistics (Gene gun) is suitable for \_\_\_\_\_.
- (A) Disarming pathogen vectors  
(B) Transformation of plant cells  
(C) Joining of DNA vector  
(D) DNA fingerprinting
38. Which of the following is the characteristic of a normal cell ?
- (A) Anchorage independent  
(B) Continuous cell lines  
(C) Dependent on external growth factor  
(D) No contact inhibition
39. Optimum pH required for the growth of mammalian cells is :
- (A) 5.3-7.0  
(B) 6.5-7.0  
(C) 7.2-7.4  
(D) 8.1-8.9
40. Transgenic animals are those which have \_\_\_\_\_.
- (A) Foreign DNA in some of its cells  
(B) Foreign DNA in all its cells  
(C) Foreign RNA in all its cells  
(D) DNA and RNA both in the cells
41. Recombination of different types of cells to form more defined tissue or organ is known as :
- (A) Organotypic culture  
(B) Primary culture  
(C) Secondary culture  
(D) Cell line
42. Which of the following statements is incorrect for gene knockout ?
- (A) Non-functional gene is introduced.  
(B) Make gene inoperative.  
(C) Introduction of functional gene in an organism.  
(D) It can be used to study the effect of loss of gene.



43. Which of the following do not incorporate in the genome and replicates in the cytoplasm ?
- (A) Poxvirus
  - (B) Baculovirus
  - (C) Adenovirus
  - (D) Retrovirus
44. Which of the following is not the part of growth medium for animal culture ?
- (A) Starch
  - (B) Serum
  - (C) Carbon source
  - (D) Inorganic salts
45. Transgenic animals can be designed to study the change in :
- (A) serum
  - (B) urine
  - (C) gene
  - (D) saliva
46. Low concentration of any pathogen can be detected by \_\_\_\_\_ of their nucleic acid.
- (A) cutting
  - (B) amplification
  - (C) joining
  - (D) denaturation
47. Disaggregating of cells can be achieved by :
- (A) physical disruption
  - (B) enzymatic digestion
  - (C) treating with chelating agents
  - (D) All of the above
48. The following are methods of sterilization, except :
- (A) Dry heat sterilization
  - (B) Autoclaving
  - (C) Sterilization by filters
  - (D) Laminar air flow
49. Herd immunity has been recently associated with :
- (A) influenza
  - (B) syphilis
  - (C) hepatitis-A
  - (D) COVID-19
50. The genetic markers are seen close together on same chromosome exhibit :
- (A) linkage
  - (B) homozygosity
  - (C) genetic concordance
  - (D) independent segregation

51. Which of the following types of vaccines did the Moderna and Pfizer-BioNTech companies design for COVID-19 ?
- (A) mRNA vaccine
  - (B) Subunit vaccine
  - (C) Toxoid vaccine
  - (D) Vector-borne vaccine
52. The first human hormone produced by recombinant DNA technology is \_\_\_\_\_.
- (A) Insulin
  - (B) Thyroxin
  - (C) Estrogen
  - (D) Progesterone
53. Introduction of foreign DNA in the genome is called \_\_\_\_\_.
- (A) Gene expression
  - (B) Transgenesis
  - (C) Transfection
  - (D) Cell hybridization
54. When a large population is immune to specific diseases, it is :
- (A) Autoimmunity
  - (B) Passive immunity
  - (C) Herd immunity
  - (D) Active immunity
55. IVF involves transfer of :
- (A) Ovum into the fallopian tube.
  - (B) Zygote into the fallopian tube.
  - (C) Zygote into the uterus.
  - (D) Embryo with 16 blastomeres into the fallopian tube.
56. The common gene delivery system for in- vivo gene therapy is :
- (A) microinjection
  - (B) lipofection
  - (C) adenoviral vectors
  - (D) electroporation
57. Which of the following diseases is best diagnosed by serologic means ?
- (A) Pulmonary tuberculosis
  - (B) Gonorrhea
  - (C) Actinomycosis
  - (D) Q fever
58. Gene therapy is a method to :
- (A) cure genetic disorders
  - (B) provide correct version of gene
  - (C) replace defective gene with a healthy gene
  - (D) All of the above
59. ET stands for :
- (A) Ejaculate Transfer
  - (B) Embryo Transfer
  - (C) Embryo Termination
  - (D) Embryo Teleportation
60. Somatic cell therapy include :
- (A) ex-vivo
  - (B) in-vivo
  - (C) Antisense therapy
  - (D) All of the above

***(Only for Rough Work)***

4. Four alternative answers are mentioned for each question as—A, B, C & D in the booklet. The candidate has to choose the most correct/appropriate answer and mark the same in the OMR Answer-Sheet as per the direction :

**Example :**

**Question :**

Q. 1 (A) ☒ (B) (C) (D)

Q. 2 (A) (B) ☒ (C) (D)

Q. 3 (A) ☒ (B) (C) (D)

Illegible answers with cutting and over-writing or half filled circle will be cancelled.

5. Each question carries equal marks. Marks will be awarded according to the number of correct answers you have.
6. All answers are to be given on OMR Answer sheet only. Answers given anywhere other than the place specified in the answer sheet will not be considered valid.
7. Before writing anything on the OMR Answer Sheet, all the instructions given in it should be read carefully.
8. After the completion of the examination candidates should leave the examination hall only after providing their OMR Answer Sheet to the invigilator. Candidate can carry their Question Booklet.
9. There will be no negative marking.
10. Rough work, if any, should be done on the blank pages provided for the purpose in the booklet.
11. To bring and use of log-book, calculator, pager and cellular phone in examination hall is prohibited.
12. In case of any difference found in English and Hindi version of the question, the English version of the question will be held authentic.

**Impt. :** On opening the question booklet, first check that all the pages of the question booklet are printed properly. If there is any discrepancy in the question Booklet, then after showing it to the invigilator, get another question Booklet of the same series.

4. प्रश्न-पुस्तिका में प्रत्येक प्रश्न के चार सम्भावित उत्तर—A, B, C एवं D हैं। परीक्षार्थी को उन चारों विकल्पों में से एक सबसे सही अथवा सबसे उपयुक्त उत्तर छोटना है। उत्तर को OMR आन्सर-शीट में सम्बन्धित प्रश्न संख्या में निम्न प्रकार भरना है :

उदाहरण :

प्रश्न :

प्रश्न 1 (A) ☒ (B) (C) (D)

प्रश्न 2 (A) (B) ☒ (C) (D)

प्रश्न 3 (A) ☒ (B) (C) (D)

अपठनीय उत्तर या ऐसे उत्तर जिन्हें काटा या बदला गया है, या गोले में आधा भरकर दिया गया, उन्हें निरस्त कर दिया जाएगा।

5. प्रत्येक प्रश्न के अंक समान हैं। आपके जितने उत्तर सही होंगे, उन्हीं के अनुसार अंक प्रदान किये जायेंगे।
6. सभी उत्तर केवल ओ. एम. आर. उत्तर-पत्रक (OMR Answer Sheet) पर ही दिये जाने हैं। उत्तर-पत्रक में निर्धारित स्थान के अलावा अन्यत्र कहीं पर दिया गया उत्तर मान्य नहीं होगा।
7. ओ. एम. आर. उत्तर-पत्रक (OMR Answer Sheet) पर कुछ भी लिखने से पूर्व उसमें दिये गये सभी अनुदेशों को सावधानीपूर्वक पढ़ लिया जाये।
8. परीक्षा समाप्ति के उपरान्त परीक्षार्थी कक्ष निरीक्षक को अपनी OMR Answer Sheet उपलब्ध कराने के बाद ही परीक्षा कक्ष से प्रस्थान करें। परीक्षार्थी अपने साथ प्रश्न-पुस्तिका ले जा सकते हैं।
9. निगेटिव मार्किंग नहीं है।
10. कोई भी रफ कार्य, प्रश्न-पुस्तिका के अन्त में, रफ-कार्य के लिए दिए खाली पेज पर ही किया जाना चाहिए।
11. परीक्षा-कक्ष में लॉग-बुक, कैलकुलेटर, पेजर तथा सेल्युलर फोन ले जाना तथा उसका उपयोग करना वर्जित है।
12. प्रश्न के हिन्दी एवं अंग्रेजी रूपान्तरण में भिन्नता होने की दशा में प्रश्न का अंग्रेजी रूपान्तरण ही मान्य होगा।

**महत्वपूर्ण :** प्रश्नपुस्तिका खोलने पर प्रथमतः जाँच कर देख लें कि प्रश्न-पुस्तिका के सभी पृष्ठ भलीभाँति छपे हुए हैं। यदि प्रश्नपुस्तिका में कोई कमी हो, तो कक्षनिरीक्षक को दिखाकर उसी सिरीज की दूसरी प्रश्न-पुस्तिका प्राप्त कर लें।